REMARKS

Claims 1-18 are all the claims presently pending in the application. Claim 18 is added. The claims have been amended to more particularly define the invention in accordance with local practice.

It is noted that the claim amendments are made only for more particularly pointing out the invention, and not for distinguishing the invention over the prior art, narrowing the claims or for any statutory requirements of patentability. Further, Applicant specifically states that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 6-17 are allowed.

Claim 5 stands rejected under 35 U.S.C. § 112, second paragraph, as indefinite. Claims 1-5 stand rejected under 35 U.S.C. § 102(e) as being anticipated by US Paten 6,639,360 to Roberts, et al.

This rejection is respectfully traversed in the following discussion.

I. THE CLAIMED INVENTION

The claimed invention is directed to a light emitting diode, including a ceramics substrate that has a high thermal conductivity and having a light emitting element that is mounted on the ceramics substrate. A radiation plate is bonded to the back surface of the ceramics substrate. The radiation plate contacts the ceramics substrate at a contact region that includes a region of the back surface of the ceramics substrate corresponding to a region of the ceramics substrate on which the light emitting element is mounted.

Conventional methods of designing light emitting diode devices, as described on at line 22 of page 1 through line 8 of page 5 suffer from one or more problems of lack of radiation, disconnection of wire, or peeling of wire from the substrate or light emitting element that occurs during reflowing or sealing.

The claimed invention, on the other hand, provides methods, including the use of a heat radiation plate bonded directly to the back of the high-thermal-conductivity ceramics substrate for dissipating heat from the light emitting diode.

Relative to new claim 18, this claim addresses the exemplary LED embodiment in which the power supplying terminals (5a,5b), which are disposed under the ceramics

substrate of the LED, as shown in Figure 3C. Therefore, this LED embodiment provides an advantage that it can be mounted as a surface mounted device (SMD) on a printed circuit board, etc., while allowing electrical connection between the power supplying terminals disposed under the ceramics substrate and a wiring on the printed circuit board, etc.

In contrast, Roberts et al (US Patent 5,539,360) discloses only LEDs with a power supplying terminal disposed on a substrate, 14 or 32. For Example, Figures 3A to 3C show conductors 22, 22a, 22b that are disposed on the top of an LED chip 12 (e.g., on the substrate 14). Furthermore, Figures 4 and 5 show electrical traces 34, 36, 54, and 56 that are disposed on the substrate 32.

Accordingly, the LED configuration of Roberts is not suitable as an SMD.

II. THE REJECTION UNDER 35 USC §112, SECOND PARAGRAPH

The Examiner considers that claim 5 is indefinite because of the terminology "and folding the inside portion of the cut." Applicants submit that, to one of ordinary skill in the art, this description is clearly described in the bent fins 49 shown in Figure 10B. However, even though Applicants consider that the original claim terminology would be readily understood, in an effort to expedite prosecution, claim 5 has been reworded for benefit of the Examiner.

Therefore, the Examiner is respectfully requested to reconsider and withdraw this rejection.

III. THE PRIOR ART REJECTION

The Examiner alleges that Roberts et al. teaches the claimed invention. Applicant submits, however, that there are elements of the claimed invention which are neither taught nor suggested by Roberts.

The Examiner relies upon the configuration shown in Figure 3B of Roberts as anticipating the present invention defined by claims 1-5. However, Applicants submit that the configuration shown in Figure 3B clearly fails to satisfy the plain meaning of the claim language for these claims.

More specifically, in the discussion at lines 33-47 of column 10, upon which the Examiner seems to rely, Roberts teaches in lines 33-38 to incorporate a standard fin assembly

as being integral to the substrate 14. Presumably, in this configuration in which the fin radiator is an integral component of the substrate, the substrate 14 is metal, as discussed at lines 16-21 of column 8. It is even more convincing that this substrate 14 shown in Figure 3B would be metal when it is realized that, if the substrate 14 were to be ceramics, the electrical conduction path cannot be obtained from an electrical component 31 through a conduction clip 38 to a lead 30.

The discussion at lines 39-45 of column 10 relates to an alternate configuration in which a Peltier cooling system 33, 35,37 is installed. In this alternative configuration, the cooling fin 35 does not contact the substrate. Rather, the Peltier cooler 33 clearly isolates the substrate 14 from the cooling fin 35.

Therefore, Applicants submit that neither of these alternative configurations teach or suggest a high-thermal-conducive ceramic substrate, in combination with a radiation plate making contact to the back side of the ceramic substrate at a location corresponding to the light emitting diode, as required to satisfy the plain meaning of the language of claim 1.

Hence, turning to the clear language of the claims, in Roberts there is no teaching or suggestion of: "... a radiation plate that is bonded to a back surface of the ceramics substrate; wherein the radiation plate contacts the ceramics substrate at a contact region that includes a region of the back surface of the ceramics substrate corresponding to a region of the ceramics substrate on which the light emitting element is mounted", as required by independent claim 1.

Moreover, relative to claim 2, Applicants submit that the configuration shown in Figures 1, 3A, 3B is clearly not a flip-chip, as that term is understood by one having ordinary skill in the art. Moreover, flipping this configuration over would clearly defeat the purpose of the device, since it is intended to radiate light out through the transparent top cover 16.

Relative to claim 3, Applicants submit that the folded wave form shown in cross sectional view in Figure 5 is clearly not taught, suggested, or otherwise demonstrated in Roberts.

Relative to claims 4 and 5, Applicants submit that the "holes" shown in Figure 3B of Roberts are not penetrating holes. Rather, they are merely gaps between fins of the radiator structure, an entirely different concept from that of forming penetrating holes through the radiator structure. Roberts does not show penetrating holes through the radiator that would correspond to the penetrating holes 48 shown in Figures 10A, 10B of the present Application, let alone the folded structure shown in Figure 10B, in which penetrations are first formed and

a portion of the metal is then folded by, for example, a pressing operation on portions of the penetrations, which bent portions then serve as radiator fins. This folded structure based on penetrating holes is fundamentally different from the normal cooling fin structure seeming shown in Figure 3B of Roberts that has projections that might be formed, for example by casting the radiator as a flat plate that is designed to have fin projections integral to the flat plate and which fin projections serve as radiating fins.

Therefore, Applicants submit that there are elements of the claimed invention defined by claims 1-5 that are not taught or suggest by Roberts et al., and the Examiner is respectfully requested to reconsider and withdraw this rejection.

IV. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-18, all the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: 8/11/05

Frederick E. Cooperrider
Registration No. 36,769

McGinn & Gibb, PLLC
8321 Old Courthouse Road, Suite 200
Vienna, VA 22182-3817
(703) 761-4100
Customer No. 21254